Electronic Supplementary Material (ESI) for Nanoscale
This journal is © The Royal Society of Chemistry 2013

Supporting information

3D plasmonic chiral colloids

Xibo Shen [a,b+], Pengfei Zhan [a+], Anton Kuzyk [b], Qing Liu [a], Ana Asenjo-Garcia [c, d], Hui Zhang [e], F. Javier García de Abajo [c, f], Alexander Govorov [e], Baoquan Ding [a]*, and Na Liu [b]*

[a] National Center for Nanoscience and Technology, No. 11 BeiYiTiao, ZhongGuanCun, Beijing 100190, China
[b] Max-Planck-Institute for Intelligent Systems, Heisenbergstr. 3, D-70569 Stuttgart, Germany
[c] ICFO-Institut de Ciencies Fotoniques, Mediterranean Technology Park, E-08860 Castelldefels, Barcelona, Spain
[d] IQFR-CSIC, Serrano 119, 28006 Madrid, Spain
[e] Department of Physics and Astronomy, Ohio University, Athens, Ohio 45701
[f] ICREA - Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain
[+]These authors contributed equally to this work.
*Address correspondence to dingbq@nanoctr.cn and laura.liu@is.mpg.de

A. Experimental Methods

1. Materials

$HAuCl_4 \cdot 3H_2O$, Hexadecyltrimethyl ammonium bromide (CTAB), Sodium dodecyl sulfate (SDS), Tris (2-carboxyethyl) phosphine hydrochloride (TCEP), Bis (*p*-sulfonatophenyl) phenyl phosphine dihydrate dipotassium salt (BSPP), Silver nitrate ($AgNO_3$), Sodium borohydride ($NaBH_4$), L-ascorbic acid, Trisodium citrate dehydrate (C), and Citric acid were purchased from Sigma-Aldrich. All chemicals were used as received without further purifications. All oligonucleotides were purchased from Invitrogen.

2. Preparation of the DNA origami

Rectangular origami templates were prepared according to reference[1] with several changes. All of the side staples were left out to prevent aggregation via helix stacking interactions between adjacent origami. Three groups of different capture strands were designed to assemble AuNRs on the origami templates. These capture strands were extended by 15 bases with specific sequences. The rectangular DNA origami was annealed at a ratio of 1:5:10 for the M13 strand, capture strands, and staples strands. The DNA origami was subsequently assembled in a 1×TAE/Mg^{2+} buffer (Tris, 40 mM; Acetic acid, 20 mM; EDTA, 2 mM; and Magnesium acetate, 12.5 mM; pH 8.0) by cooling slowly from 90 °C to room temperature. The DNA origami was then filtered with 100 kDa (MWCO) centrifuge filters to remove the extra capture strands and staple strands.

3. Synthesis of the AuNRs

A two-step method was used to synthesize AuNRs according to reference[2].

a. Synthesis of the AuNR seeds

50 μL of 2% (w/v) $HAuCl_4$ solution and 7.5 mL of 100 mM CTAB solution were added to a 25 mL flask. A 600 μL of ice-cold $NaBH_4$ solution (10 mM) was added to the flask under vigorous

stirring. The color of the solution changed quickly to yellowish brown. The resulting solution acted as nucleation seeds for the AuNR synthesis in the next step.

b. Synthesis of the AuNRs

An 80 μL of 2% (w/v) $HAuCl_4$ solution was added to a10 mL of 100 mM CTAB solution. 75 μL of 10 mM $AgNO_3$ solution and 50 μL of 100 mM L-ascorbic acid solution were added to the flask in order. A 20 μL seed solution was added to the mixture solution under stirring. The final solution was kept undisturbed at 28 °C about 5 hours after being stirred for 1 minute.

c. Purification of the AuNRs

A10 mL AuNR solution was centrifuged at 8000 rpm for 30 minutes and then the supernatant was removed with a pipette. The pellet was suspended in 10 mL water. The solution was centrifuged at 3000 rpm for 25 minutes and the supernatant was collected. The AuNR solution was then centrifuged at 8000 rpm for 30 minutes. The supernatant was discarded. The pellet was suspended in 100 μL water. The concentration was measured by a UV spectrometer.

4. Preparation of the AuNRs modified with thiolated DNA

The disulfide bonds in the thiolated oligonucleotides were reduced to monothiol using TCEP (20mM, 1h) in water. The oligonucleotides were purified using size exclusion columns (G-25, GE Healthcare) to remove small molecules.

The purified DNA was added to the AuNR solution (OD～1) containing 0.01% (w/v) SDS with a molecular ratio of 4000: 1. The mixture solution was incubated for 6 hours at 28 °C. Then the buffer concentration was adjusted to 1× TBE (89 mM Tris, 89 mM boric acid, 2 mM EDTA, pH 8.0) from a 10× TBE buffer. After that, a 5M NaCl solution was slowly added until the final concentration of NaCl reached 500 mM in 24 hours.

Subsequently, the AuNR-DNA conjugates were centrifuged at 8000 rpm for 25 minutes. The pellet was suspended in a 1 mL 0.5× TBE buffer containing 200 mM NaCl while the supernatant was discarded. The same centrifugation procedure was repeated three times to completely remove the excess thiolated DNA.

5. Self-assembly of the AuNRs on the DNA origami templates

The purified rectangular DNA origami structures were mixed with the AuNR-DNA conjugates at a ratio of two AuNRs for each binding group on the DNA origami. The mixture was annealed from 45 °C to 25 °C for 30 cycles in 2 hours.

6. Purification of the DNA origami assembled AuNRs

The annealed product of the DNA origami assembled AuNRs was loaded in a 0.8% Ethidium Bromide stained agarose gel (running buffer 1× TAE/Mg^{2+}, loading buffer 60% glycerol, 15 V/cm). Selected bands were cut out and the DNA origami assembled AuNRs were extracted from the gel with Freeze-Squeeze columns (Bio-Rad) at 4 °C or by electro-elution with dialysis tubing membranes (MWCO: 50K).

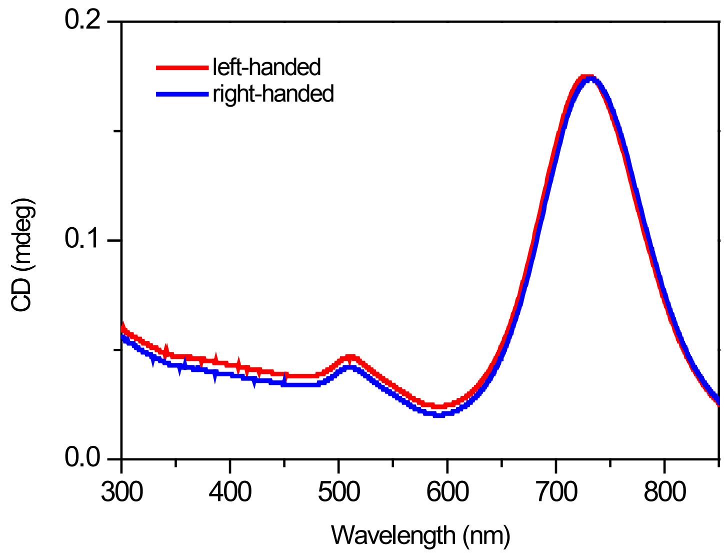


Fig. S1 Extinction spectra of the left- (red) and right-handed (blue) twisted AuNR structures.

7. **TEM characterization of the DNA origami assembled AuNRs**

The samples for TEM imaging were prepared by depositing a 4 μL of the sample solution on a carbon-coated TEM grid. After 10 min, the excess solution was wicked from the grid using filter paper. To remove the deposited salt, the grid was washed with a droplet of water and the excess water was wicked away using filter paper. A droplet of a 0.7% uranyl acetate solution was used to treat the grid and the excess solution was wicked away. Then, the grid was treated with a second droplet of the uranyl acetate solution for 40 seconds and the excess solution was removed using filter paper. All the grids were kept at room temperature. TEM studies were conducted using a Tecnei G2-20S TWIN, operating at 200 kV in a dark field mode.

8. Circular Dichroism measurements

The CD spectra were measured by a Jasco J-815 spectropolarimeter using the following parameters: wavelength range, 200 nm to 900 nm; optical length, 0.5 cm; scanning speed, 200 nm/min.

Quantitative analysis of bands on the agarose gel was performed using Image J (http://rsb.info.nih.gov/ij/). The target bands yields of left-handed crosses and right-handed crosses were 65.1% and 67.4%, respectively. Target bands were cut out; the AuNRs crosses were extracted from the gel and imaged with TEM. The yields on the TEM images were counted to be 80.5% (91/113) for left-handed structures and 82.2% (88/107) for right-handed structures.

B. Supporting figures and legends

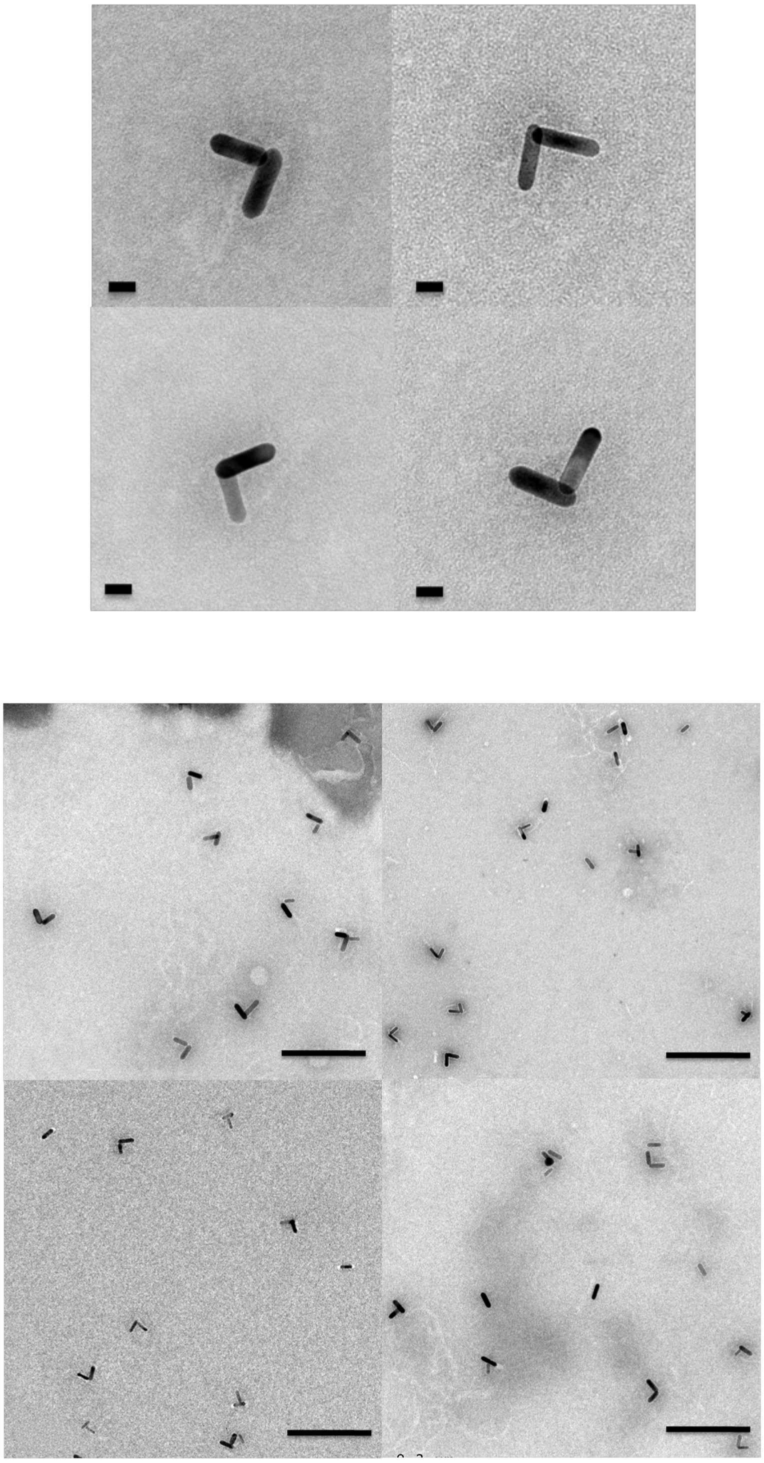
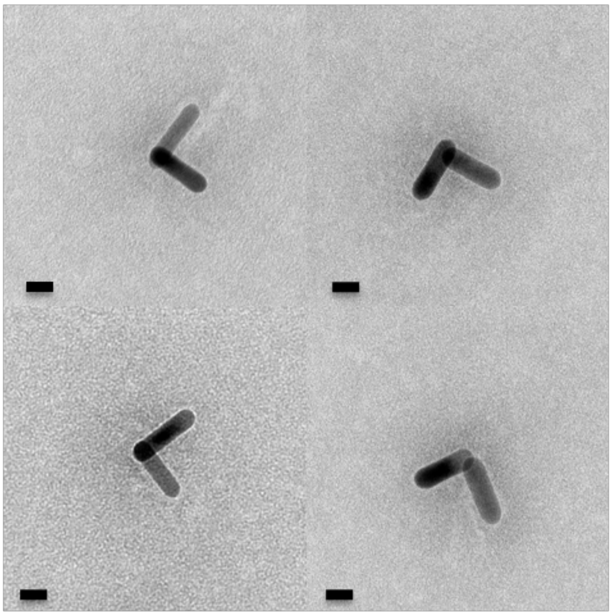


Fig. S2 Additional TEM images of the left-handed twisted AuNR structures (top scale bar: 20 nm; bottom scale bare: 200 nm).



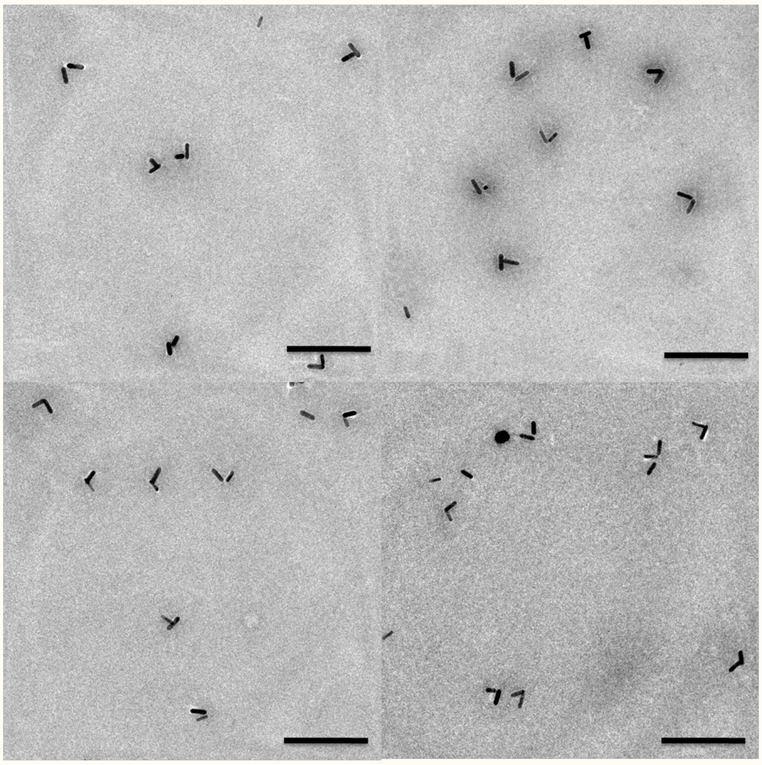


Fig. S3 Additional TEM images of the right-handed twisted AuNR structures (top scale bar: 20 nm; bottom scale bare: 200 nm).

C. DNA strands used in the experiment

1. Capture strands

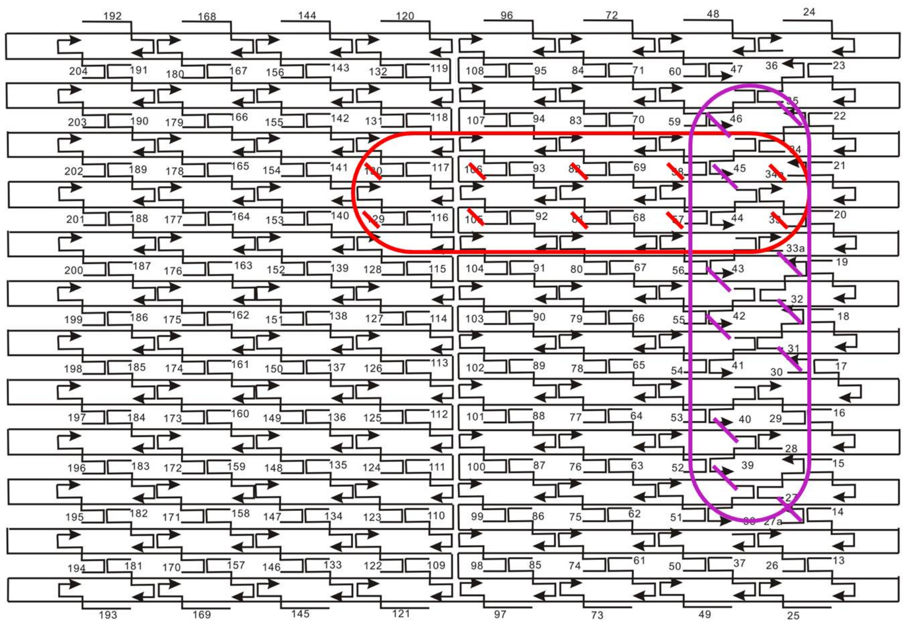


Fig. S4 Design of the left-handed twisted AuNR structure.

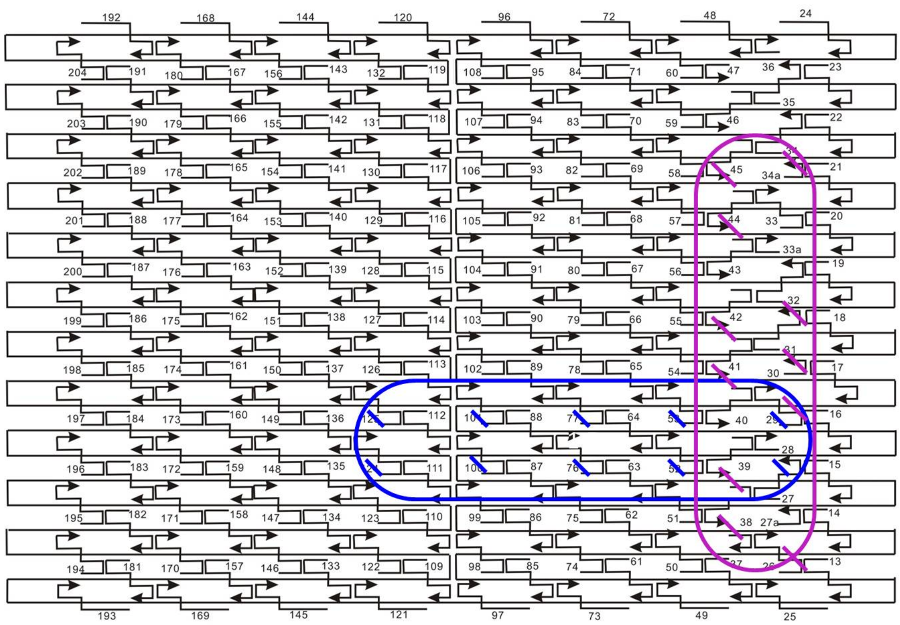


Fig. S5 Design of the right-handed twisted AuNR structure.

Binding Site (red)

R29, AAAAAAAAAAAAAAAAACCCGTCGTCATATGTACCCCGGTAAAGGCTA

R30, AAAAAAAAAAAAAAAATCAGGTCACTTTTGCG

R53, AAAAAAAAAAAAAAAACTTTCATCCCCAAAAACAGGAAGACCGGAGAG

R54, AAAAAAAAAAAAAAAAGGTAGCTAGGATAAAAATTTTTAGTTAACATC

R77, AAAAAAAAAAAAAAAAAAATAATTTTAAATTGTAAACGTTGATATTCA

R78, AAAAAAAAAAAAAAAAACCGTTCTAAATGCAATGCCTGAGAGGTGGCA

R101, AAAAAAAAAAAAAAAAGCTCATTTTCGCATTAAATTTTTGAGCTTAGA

R102, AAAAAAAAAAAAAAAAAGACAGTCATTCAAAAGGGTGAGAAGCTATAT

R125, AAAAAAAAAAAAAAAATAGAATCCCTGAGAAGAGTCAATAGGAATCAT

R126, AAAAAAAAAAAAAAAAAATTACTACAAATTCTTACCAGTAATCCCATC

Binding site (blue)

R33,AAAAAAAAAAAAAAAACTGGATAACGGAACAACATTATTACCTTATG

R34a, AAAAAAAAAAAAAAACGATTTTAGAGGACAG

R57,AAAAAAAAAAAAAAATTTGCCAGATCAGTTGAGATTTAGTGGTTTAA

R58, AAAAAAAAAAAAAAATTTCAACTATAGGCTGGCTGACCTTGTATCAT

R81,AAAAAAAAAAAAAAACCAAAATATAATGCAGATACATAAACACCAGA

R82, AAAAAAAAAAAAAAAACGAGTAGTGACAAGAACCGGATATACCAAGC

R105, AAAAAAAAAAAAAAACATAACCCGAGGCATAGTAAGAGCTTTTTAAG

R106, AAAAAAAAAAAAAAAGAATAAGGACGTAACAAAGCTGCTCTAAAACA

R129, AAAAAAAAAAAAAAAGCAATAGCGCAGATAGCCGAACAATTCAACCG

R130, AAAAAAAAAAAAAAAATTGAGGGTAAAGGTGAATTATCAATCACCGG

Binding site (purple)

R27, AATAATAATAATAATAATTTCGACTCTGCAAGGCGATTAAGTTCGCATCGT

R31,AATAATAATAATAATAATTGGAGAAGCAGAATTAGCAAAATTAAAGTACGG

R32, AATAATAATAATAATAATTTGTCTGGAAGAGGTCATTTTTGCGCAGAAAAC

R33a, AATAATAATAATAATAATTGAGAATGAATGTTTAG

R35, AATAATAATAATAATAATTTGAGGACTAGGGAGTTAAAGGCCGAAAGGAAC

R39, AATAATAATAATAATAATTGATGTGCTAGAGGATCCCCGGGTACTTTCCAG

R40,AATAATAATAATAATAATTATGTGAGCATCTGCCAGTTTGAGGGAAAGGGG

R41, AATAATAATAATAATAATT AGATCTACTGATAATCAGAAAAGCAACATTAA

R42,AATAATAATAATAATAATTTCAAGGCAACTTTATTTCAACGCAATTTTTGAG

R43, AATAATAATAATAATAATT TTTTGATAAGTTTCATTCCATATACATACAGG

R44, AATAATAATAATAATAATTTATAGTAAACCATAAATCAAAAATCATTGCTCC

R45, AATAATAATAATAATAATTTGTGAATTACAGGTAGAAAGATTCAGGGGGTA

R46, AATAATAATAATAATAATTTCGAAATCTGTACAGACCAGGCGCTTAATCAT

2. Sequences used in the assembly of the DNA origami template

13 TGGTTTTTAACGTCAAAGGGCGAAGAACCATC

14 CTTGCATGCATTAATGAATCGGCCCGCCAGGG

15 TAGATGGGGGGTAACGCCAGGGTTGTGCCAAG

16 CATGTCAAGATTCTCCGTGGGAACCGTTGGTG

17 CTGTAATATTGCCTGAGAGTCTGGAAAACTAG

18 TGCAACTAAGCAATAAAGCCTCAGTTATGACC

19 AAACAGTTGATGGCTTAGAGCTTATTTAAATA

20 ACGAACTAGCGTCCAATACTGCGGAATGCTTT

21 CTTTGAAAAGAACTGGCTCATTATTTAATAAA

22 ACGGCTACTTACTTAGCCGGAACGCTGACCAA

23 GAGAATAGCTTTTGCGGGATCGTCGGGTAGCA

24 ACGTTAGTAAATGAATTTTCTGTAAGCGGAGT

25 ACCCAAATCAAGTTTTTTGGGGTCAAAGAACG

26 TGGACTCCCTTTTCACCAGTGAGACCTGTCGT

27a GCCAGCTGCCTGCAGG

27 TCGACTCTGCAAGGCGATTAAGTTCGCATCGT

28 AACCGTGCGAGTAACA

29 ACCCGTCGTCATATGTACCCCGGTAAAGGCTA

30 TCAGGTCACTTTTGCG

31 GGAGAAGCAGAATTAGCAAAATTAAAGTACGG

32 TGTCTGGAAGAGGTCATTTTTGCGCAGAAAAC

33a GAGAATGAATGTTTAG

33 ACTGGATAACGGAACAACATTATTACCTTATG

34a, CGATTTTAGAGGACAG

34 ATGAACGGCGCGACCT GCTCCATGAGAGGCTT

35 TGAGGACTAGGGAGTTAAAGGCCGAAAGGAAC

36 AACTAAAGCTTTCCAG

37 AGCTGATTACAAGAGTCCACTATTGAGGTGCC

38 CGGGAAACGGGCAAC

39 GATGTGCTAGAGGATCCCCGGGTACTTTCCAG

40 ATGTGAGCATCTGCCAGTTTGAGGGAAAGGGG

41 AGATCTACTGATAATCAGAAAAGCAACATTAA

42 TCAAGGCAACTTTATTTCAACGCAATTTTTGAG

43 TTTTGATAAGTTTCATTCCATATACATACAGG

44 TATAGTAAACCATAAATCAAAAATCATTGCTCC

45 TGTGAATTACAGGTAGAAAGATTCAGGGGGTA

46 TCGAAATCTGTACAGACCAGGCGCTTAATCAT

47, AGGCTTGCAAAGACTTTTTCATGAAAATTGTG

47a, AGGCTTGCAAAGACTT

48 CGTAACGATCTAAAGTTTTGTCGTGAATTGCG

49 GTAAAGCACTAAATCGGAACCCTAGTTGTTCC

50 AGTTTGGAGCCCTTCACCGCCTGGTTGCGCTC

51 ACTGCCCGCCGAGCTCGAATTCGTTATTACGC

52 CAGCTGGCGGACGACGACAGTATCGTAGCCAG

53 CTTTCATCCCCAAAAACAGGAAGACCGGAGAG

54 GGTAGCTAGGATAAAAATTTTTAGTTAACATC

55 CAATAAATACAGTTGATTCCCAATTTAGAGAG

56 TACCTTTAAGGTCTTTACCCTGACAAAGAAGT

57 TTTGCCAGATCAGTTGAGATTTAGTGGTTTAA

58 TTTCAACTATAGGCTGGCTGACCTTGTATCAT

59 CGCCTGATGGAAGTTTCCATTAAACATAACCG

60 ATATATTCTTTTTTCACGTTGAAAATAGTTAG

61 GAGTTGCACGAGATAGGGTTGAGTAAGGGAGC

62 TCATAGCTACTCACATTAATTGCGCCCTGAGA

63 GAAGATCGGTGCGGGCCTCTTCGCAATCATGG

64 GCAAATATCGCGTCTGGCCTTCCTGGCCTCAG

65 TATATTTTAGCTGATAAATTAATGTTGTATAA

66 CGAGTAGAACTAATAGTAGTAGCAAACCCTCA

67 TCAGAAGCCTCCAACAGGTCAGGATCTGCGAA

68 CATTCAACGCGAGAGGCTTTTGCATATTATAG

69 AGTAATCTTAAATTGGGCTTGAGAGAATACCA

70 ATACGTAAAAGTACAACGGAGATTTCATCAAG

71 AAAAAAGGACAACCATCGCCCACGCGGGTAAA

72 TGTAGCATTCCACAGACAGCCCTCATCTCCAA

73 CCCCGATTTAGAGCTTGACGGGGAAATCAAAA

74 GAATAGCCGCAAGCGGTCCACGCTCCTAATGA

75 GTGAGCTAGTTTCCTGTGTGAAATTTGGGAAG

76 GGCGATCGCACTCCAGCCAGCTTTGCCATCAA

77 AAATAATTTTAAATTGTAAACGTTGATATTCA

78 ACCGTTCTAAATGCAATGCCTGAGAGGTGGCA

79 TCAATTCTTTTAGTTTGACCATTACCAGACCG

80 GAAGCAAAAAAGCGGATTGCATCAGATAAAAA

81 CCAAAATATAATGCAGATACATAAACACCAGA

82 ACGAGTAGTGACAAGAACCGGATATACCAAGC

83 GCGAAACATGCCACTACGAAGGCATGCGCCGA

84 CAATGACACTCCAAAAGGAGCCTTACAACGCC

85 CCAGCAGGGGCAAAATCCCTTATAAAGCCGGC

86 GCTCACAATGTAAAGCCTGGGGTGGGTTTGCC

87 GCTTCTGGTCAGGCTGCGCAACTGTGTTATCC

88 GTTAAAATTTTAACCAATAGGAACCCGGCACC

89 AGGTAAAGAAATCACCATCAATATAATATTTT

90 TCGCAAATGGGGCGCGAGCTGAAATAATGTGT

91 AAGAGGAACGAGCTTCAAAGCGAAGATACATT

92 GGAATTACTCGTTTACCAGACGACAAAAGATT

93 CCAAATCACTTGCCCTGACGAGAACGCCAAAA

94 AAACGAAATGACCCCCAGCGATTATTCATTAC

95 TCGGTTTAGCTTGATACCGATAGTCCAACCTA

96 TGAGTTTCGTCACCAGTACAAACTTAATTGTA

97 GAACGTGGCGAGAAAGGAAGGGAACAAACTAT

98 CCGAAATCCGAAAATCCTGTTTGAAGCCGGAA

99 GCATAAAGTTCCACACAACATACGAAGCGCCA

100 TTCGCCATTGCCGGAAACCAGGCATTAAATCA

101 GCTCATTTTCGCATTAAATTTTTGAGCTTAGA

102 AGACAGTCATTCAAAAGGGTGAGAAGCTATAT

103 TTTCATTTGGTCAATAACCTGTTTATATCGCG

104 TTTTAATTGCCCGAAAGACTTCAAAACACTAT

105 CATAACCCGAGGCATAGTAAGAGCTTTTTAAG

106 GAATAAGGACGTAACAAAGCTGCTCTAAAACA

107 CTCATCTTGAGGCAAAAGAATACAGTGAATTT

108 CTTAAACATCAGCTTGCTTTCGAGCGTAACAC

109 ACGAACCAAAACATCGCCATTAAATGGTGGTT

110 CGACAACTAAGTATTAGACTTTACAATACCGA

111 CTTTTACACAGATGAATATACAGTAAACAATT

112 TTAAGACGTTGAAAACATAGCGATAACAGTAC

113 GCGTTATAGAAAAAGCCTGTTTAGAAGGCCGG

114 ATCGGCTGCGAGCATGTAGAAACCTATCATAT

115 CCTAATTTACGCTAACGAGCGTCTAATCAATA

116 AAAAGTAATATCTTACCGAAGCCCTTCCAGAG

117 TTATTCATAGGGAAGGTAAATATTCATTCAGT

118 GAGCCGCCCCACCACCGGAACCGCGACGGAAA

119 AATGCCCCGTAACAGTGCCCGTATCTCCCTCA

120 CAAGCCCAATAGGAACCCATGTACAAACAGTT

121 CGGCCTTGCTGGTAATATCCAGAACGAACTGA

122 TAGCCCTACCAGCAGAAGATAAAAACATTTGA

123 GGATTTAGCGTATTAAATCCTTTGTTTTCAGG

124 TTTAACGTTCGGGAGAAACAATAATTTTCCCT

125 TAGAATCCCTGAGAAGAGTCAATAGGAATCAT

126 AATTACTACAAATTCTTACCAGTAATCCCATC

127 CTAATTTATCTTTCCTTATCATTCATCCTGAA

128 TCTTACCAGCCAGTTACAAAATAAATGAAATA

129 GCAATAGCGCAGATAGCCGAACAATTCAACCG

130 ATTGAGGGTAAAGGTGAATTATCAATCACCGG

128 AACCAGAGACCCTCAGAACCGCCAGGGGTCAG

132 TGCCTTGACTGCCTATTTCGGAACAGGGATAG

133 AGGCGGTCATTAGTCTTTAATGCGCAATATTA

134 TTATTAATGCCGTCAATAGATAATCAGAGGTG

135 CCTGATTGAAAGAAATTGCGTAGACCCGAACG

136 ATCAAAATCGTCGCTATTAATTAACGGATTCG

137 ACGCTCAAAATAAGAATAAACACCGTGAATTT

138 GGTATTAAGAACAAGAAAAATAATTAAAGCCA

139 ATTATTTAACCCAGCTACAATTTTCAAGAACG

140 GAAGGAAAATAAGAGCAAGAAACAACAGCCAT

141 GACTTGAGAGACAAAAGGGCGACAAGTTACCA

142 GCCACCACTCTTTTCATAATCAAACCGTCACC

143 CTGAAACAGGTAATAAGTTTTAACCCCTCAGA

144 CTCAGAGCCACCACCCTCATTTTCCTATTATT

145 CCGCCAGCCATTGCAACAGGAAAAATATTTTT

146 GAATGGCTAGTATTAACACCGCCTCAACTAAT

147 AGATTAGATTTAAAAGTTTGAGTACACGTAAA

148 ACAGAAATCTTTGAATACCAAGTTCCTTGCTT

149 CTGTAAATCATAGGTCTGAGAGACGATAAATA

150 AGGCGTTACAGTAGGGCTTAATTGACAATAGA

151 TAAGTCCTACCAAGTACCGCACTCTTAGTTGC

152 TATTTTGCTCCCAATCCAAATAAGTGAGTTAA

153 GCCCAATACCGAGGAAACGCAATAGGTTTACC

154 AGCGCCAACCATTTGGGAATTAGATTATTAGC

155 GTTTGCCACCTCAGAGCCGCCACCGATACAGG

156 AGTGTACTTGAAAGTATTAAGAGGCCGCCACC

157 GCCACGCTATACGTGGCACAGACAACGCTCAT

158 ATTTTGCGTCTTTAGGAGCACTAAGCAACAGT

159 GCGCAGAGATATCAAAATTATTTGACATTATC

160 TAACCTCCATATGTGAGTGAATAAACAAAATC

161 CATATTTAGAAATACCGACCGTGTTACCTTTT

162 CAAGCAAGACGCGCCTGTTTATCAAGAATCGC

163 TTTTGTTTAAGCCTTAAATCAAGAATCGAGAA

164 ATACCCAAGATAACCCACAAGAATAAACGATT

165 AATCACCAAATAGAAAATTCATATATAACGGA

166 CACCAGAGTTCGGTCATAGCCCCCGCCAGCAA

167 CCTCAAGAATACATGGCTTTTGATAGAACCAC

168 CCCTCAGAACCGCCACCCTCAGAACTGAGACT

169 GGAAATACCTACATTTTGACGCTCACCTGAAA

170 GCGTAAGAGAGAGCCAGCAGCAAAAAGGTTAT

171 CTAAAATAGAACAAAGAAACCACCAGGGTTAG

172 AACCTACCGCGAATTATTCATTTCCAGTACAT

173 AAATCAATGGCTTAGGTTGGGTTACTAAATTT

174 AATGGTTTACAACGCCAACATGTAGTTCAGCT

175 AATGCAGACCGTTTTTATTTTCATCTTGCGGG

176 AGGTTTTGAACGTCAAAAATGAAAGCGCTAAT

177 ATCAGAGAAAGAACTGGCATGATTTTATTTTG

178 TCACAATCGTAGCACCATTACCATCGTTTTCA

179 TCGGCATTCCGCCGCCAGCATTGACGTTCCAG

180 TAAGCGTCGAAGGATTAGGATTAGTACCGCCA

181 CTAAAGCAAGATAGAACCCTTCTGAATCGTCT

182 CGGAATTATTGAAAGGAATTGAGGTGAAAAAT

183 GAGCAAAAACTTCTGAATAATGGAAGAAGGAG

184 TATGTAAACCTTTTTTAATGGAAAAATTACCT

185 AGAGGCATAATTTCATCTTCTGACTATAACTA

186 TCATTACCCGACAATAAACAACATATTTAGGC

187 CTTTACAGTTAGCGAACCTCCCGACGTAGGAA

188 TTATTACGGTCAGAGGGTAATTGAATAGCAGC

189 CCGGAAACACACCACGGAATAAGTAAGACTCC

190 TGAGGCAGGCGTCAGACTGTAGCGTAGCAAGG

191 TGCTCAGTCAGTCTCTGAATTTACCAGGAGGT

192 TATCACCGTACTCAGGAGGTTTAGCGGGGTTT

193 GAAATGGATTATTTACATTGGCAGACATTCTG

194 GCCAACAGTCACCTTGCTGAACCTGTTGGCAA

195 ATCAACAGTCATCATATTCCTGATTGATTGTT

196 TGGATTATGAAGATGATGAAACAAAATTTCAT

197 TTGAATTATGCTGATGCAAATCCACAAATATA

198 TTTTAGTTTTTCGAGCCAGTAATAAATTCTGT

199 CCAGACGAGCGCCCAATAGCAAGCAAGAACGC

200 GAGGCGTTAGAGAATAACATAAAAGAACACCC

201 TGAACAAACAGTATGTTAGCAAACTAAAAGAA

202 ACGCAAAGGTCACCAATGAAACCAATCAAGTT

203 TGCCTTTAGTCAGACGATTGGCCTGCCAGAAT

204 GGAAAGCGACCAGGCGGATAAGTGAATAGGTG

References

1. Kyle Lund et. al. Nature 2010, **465**, 206-310.

2. B. Nikoobakht and M. A. El-Sayed, Chem. Mater. 2003, **15**, 1957.